**Interim Water Control Plan**
**For**
**Pumping Station S-357**

**US Army Corps of Engineers**
**Jacksonville District**

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Pertinent Data – Hydraulic Design data for Pumping Station S-357

Location: Western Miami-Dade County, 8.5 Square Mile Area residential canal approximately 4,000 feet west of L-31N.

| | |
|---|---|
| Design Capacity | 575 cfs |
| Number of Pumps | 5 |
| Pump Mix Type and Size | |
| Diesel (# @ capacity, each) | 4 @ 125 cfs |
| Electric (# @ capacity, each) | 1 @ 75 cfs |
| Intake Water Surface Elevations | |
| Maximum Pumping | 9.5 ft |
| Maximum Non-Pumping | 7.0 ft |
| Normal Pumping | 5.0 ft to 6.5 ft |
| Start Pumping | 5.2 ft Wet<br>5.7 ft Dry |
| Normal Drawdown Pumping | 4.9 ft |
| Minimum Pumping | 0.0 ft |
| Minimum Non-Pumping | 0.0 ft |
| Discharge Water Surface Elevations | |
| Maximum Pumping | 11.0 ft |
| Normal Pumping | 6.0 ft to 9.0 ft |
| Minimum Pumping | 5.0 ft |
| Minimum Non-Pumping | 5.0 ft |
| Channels & Approaches | |
| Channel Bottom Width | 30 ft |
| Side Slopes | 1V:1H<br>1V:3H above Miami Oolite (Near surface) |
| Intake Channel Invert | -8.5 ft |
| Discharge Pond Invert | 1.0 ft |

All elevations refer to the National Geodetic Vertical Datum of 1929 (NGVD) and are in feet, unless otherwise specified throughout this document.

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## 7-01. Introduction

This document represents the development of operating criteria for the S-357 Pump station. The S-357 pump station is a feature of the final recommended plan Alternative 6D for the Modified Water Deliveries (MWD) to Everglades National Park (ENP) Project, 8.5 Square Mile Area General Reevaluation Report and Supplemental Environmental Impact Statement (GRR/SEIS) completed in July 2000. In addition the Canal 111 (C-111) Project has been modified since the May 1994 Final Integrated General Reevaluation Report (GRR) and Environmental Impact Statement (EIS), as documented in the June 2007 Environmental Assessment and Engineering Documentation Report. Portions of theses two projects are being constructed simultaneously and will eventually work in conjunction with each other. Both the MWD and C-111 projects are integral parts of the Central and Southern Florida (C&SF) project. The operational integration of these two projects is to be accomplished by the Combined Structural and Operational Plan (CSOP). CSOP is an integrated structural and operational plan for two modifications of the C&SF project. The intent of CSOP is to be consistent with the authorized purposes of both the MWD and C-111 projects as defined by the authorizing legislation and further refined by subsequent general design memorandums, general reevaluation reports and supplements to these documents. Specifically, the purpose of CSOP is to define the operational plan for these C&SF project modifications which was not included in previous design documents in a consistent manner to enhance water deliveries to ENP while maintaining the other authorized purposes of both projects.

This Water Control Plan will be interim and work in conjunction with the December 2006 Interim Operational Plan (IOP) for Protection of the Cape Sable seaside sparrow (CSSS) and will be utilized until the CSOP plan is authorized and fully operational.

The S-357 pump station, 8.5 Square Mile Area (8.5 SMA) levee and seepage collection canal, and stormwater treatment area (STA) will be completed prior to full construction of the C-111 buffer features and prior to the signed record of decision (ROD) for the CSOP. The operation of the S-357 pump station, associated seepage canal, and STA will be an incremental adjustment toward

restoration of the Northeast Shark River Slough until the full implementation of all the MWD and C-111 features can occur.

All elevations in this report refer to the National Geodetic Vertical Datum of 1929 (NGVD) and are in feet, unless otherwise specified through out this document.

## 7-02. Location

The S-357 pump station is located, per the GRR/SEIS Alternative 6D, at the southern terminus of the 8.5 Square Mile Area (8.5 SMA) seepage collection canal, in western Miami-Dade County, Florida approximately 3 miles west of Krome Ave (SR-997). The new station is located approximately 200 feet south of 168th Street (Richmond Drive) between SW 205th Avenue and SW 206th Avenue.

The seepage canal system and interior levees run along 205th Avenue north from 168th Street (Richmond Drive) to 132nd Street (Howard Drive), then turns to the east paralleling 132nd Street and terminates approximately ½ mile west of the L-31N Canal.

The STA is located 2,000 feet south of 168th Street and is approximately ½ mile southwest of the pump station. The pump station, S-357, and STA are connected by an above ground flow-way which is approximately 320 feet wide.

## 7-03. Description

Alternative 6D consists of an exterior and interior levee as well as a seepage canal. The seepage collection canal is designed to maintain the groundwater levels within the area interior of the outer levee at the same levels as existed prior to the implementation of the MWD Project. Two interior levees, one on either side of the seepage canal, are positioned to prevent surface water from entering the seepage canal. The new pumping structure (S-357) located at the southern terminus of the seepage canal will discharge seepage water into the flow-way and subsequently into the 8.5 SMA STA. Discharges out of the STA will not be allowed until the C-111 Northern Detention Area (NDA) is constructed. Correspondingly, the STA discharge weirs, located along the south side of the STA will be constructed at heights of 3.5 and 4.0 feet above average ground surface (east and west respectively). Once the C-111 Canal project's NDA is constructed the eastern

discharge weir in the STA will be lowered from 3.5 feet to 1.5 feet above grade to allow flow from the STA into the NDA.

### *7-03.1.* Pump Station S-357

The S-357 pump station is designed for a capacity of 575 cubic feet per second (cfs), consisting of 4 diesel driven pumps (125 cfs each) and one electric driven pump (75 cfs). The four diesel driven vertical axial flow pumps shall each discharge not less than 56,100 gallons per min (125 cfs) against a total head corresponding to a static head of 15.5 feet, and shall be capable of constant speed operation from a static head of 15.5 feet down to and including a static head of 6.0 feet with water surface in intake sump ranging from elevation 0.0 feet to elevation 9.5 feet. The electric motor driven pump shall discharge not less than 33,665 gallons per min (75 cfs) against total head corresponding to a static head of 14.5 feet, and shall be capable of constant speed operation from a static head of 14.5 feet down to and including a static head of 5 feet with water surface in intake sump ranging from elevation 0.0 feet to elevation 9.5 feet.

The station occupies a footprint approximately 50 feet by 100 feet in plan with an operating finish floor elevation of 18.5 feet and upstream service bridge elevation of 10.0 feet. The seepage canal will transition from a bottom width of 30 feet at elevation of negative 8.5 feet approximately 175 feet upstream of the pump station to a bottom width of 65 feet at elevation negative 12.0 at the beginning of the upstream apron. Discharge from the pump station will be into settling pond with a concrete apron at elevation 1.0 feet. From the settling pond the flow will transition back to natural grade where the water will flow via an approximately 320 feet wide above ground flow-way to the STA. Following completion of the C-111 Northern Detention Area construction, discharges from the STA will be allowed.

### *7-03.2.* Seepage Canal and Interior Levee

The seepage canal is approximately 3.5 miles long with a canal invert elevation varying from negative 8.5 to negative 6.09 feet and a bottom width varying from 25 to 30 feet. The canal will have 3 double barrel 10-foot diameter corrugated aluminum pipe (CAP) located at the seepage canal crossings of SW 136$^{th}$ Street, SW 197$^{th}$ Ave, and SW 199$^{th}$ Ave

and 2 double barrel 12-foot diameter CAP located at the crossings of SW 152nd Street and SW168th Street. The interior levee surrounding the seepage canal will have a 12–foot crown width, 9.5–foot top elevation and 1 Vertical to 3 Horizontal (1V to 3H) side slopes. The interior levees prevent surface water runoff from directly entering the seepage canal.

### *7-03.3.* Perimeter Levee

The perimeter levee approximately 6.75 miles long is designed with a 20-foot crown width, 10.2–foot top elevation and 1V to 3H side slopes.

### *7-03.4.* Stormwater Treatment Area and Flow-way

The flow-way and STA levees (a combined length of approximately 3 miles) will have a 12-foot crown width, 1V to 4H side slopes, and a top elevation of 13 feet. Control of the flow-way is by a 400–foot weir approximately 2.5 feet above grade (elevation 9.5 feet) at the southern end before entering the STA. Discharge from the STA into the C-111 NDA will be by two fixed overflow weirs each 350 feet long. The STA overflow weirs, located along the south side of the STA, will have crest elevations approximately of 3.5 feet (elevation 10.5 feet) and 4 feet (elevation 11 feet) above grade for the east and west locations, respectively.

## 7-04. Purpose

The levee and seepage collection canal are designed to mitigate for increased flood risk as a result of projected increased water levels in North East Shark River Slough (NESRS) and other portions of ENP due to the implementation of the MWD Project. S-357 will maintain water stages within the interior seepage canal to provide for flood damage reduction (flood mitigation) in the 8.5 SMA and to preserve hydroperiods within the Everglades. The seepage canal and S-357 are designed to work together to maintain water levels within the area interior of the outer perimeter levee. The objective is to control the water level in the seepage collection canal to maintain the groundwater levels within the area interior of the perimeter levee at the same levels as existed prior to the implementation of the MWD project.

## 7-05. Operating Plan

### *7-05.1.* General Information

Upon completion of the construction of the 8.5 SMA features, the USACE Jacksonville District will assume operation and maintenance responsibilities of the pump station (S-357) until such a time as the S-331 Command and Control building is fully operational. The S-331 Command and Control (S-331 C&C) building project scope includes adding a command and control room to the South Florida Water Management District (SFWMD) existing pump station S-331; adding equipment to transmit and receive SCADA and security data between S-331, S-332B, S-332C, S-332D, S-356 and S-357; and installing building enclosures to provide severe weather protection and noise reduction for diesel engines at S-322B, S-332C, and S-356. Upon completion of the S-331 C&C Building, the local sponsor, SFWMD, will assume operation and maintenance responsibilities of the S-357 pump station.

As per the Record of Decision (ROD) for the 8.5 SMA SEIS, no deviations are intended from the operations specified in this water control plan (i.e. increased pumping in the seepage canal or the inclusion of additional pumps) due to anticipated public demand for the increased flood relief inside the perimeter levee of the 8.5 SMA project.

Operation of S-357 should not adversely impact the restoration levels of the ENP hydrology. A monitoring, evaluation, and reporting program shall be implemented to ensure operations are consistent with the anticipated level of service.

Until the completion of CSOP, S-357 will be operated according to this interim plan and in conjunction with IOP, which is the current authorized operational plan until the CSOP ROD is signed and all construction components are operational. Two phases for S-357 operations will exist based on the C-111 Project. The first phase will be prior to the construction of the C-111 Northern Detention Area (C-111 NDA), the extension of the existing S-332B North Detention Area to the southern side of the 8.5 SMA STA. The second phase will be after the construction of the C-111 NDA.

## *7-05.2.* **Phase *1 S-357 Operating Plan***

Prior to the completion of the C-111 NDA, the 8.5 SMA pump station and general area will be operated as follows:

### 7-05.1.1 S-357 and 8.5 SMA STA

Pump Station S-357 will operate during high water levels. The pump station will "trigger" (or turn on/off) based on water levels in a stilling well located in the new seepage canal approximately 3,500 feet west of L-31N (about 1,000 feet from the seepage canal northern terminus). Two different criterias will be set for this pump station based on time of year:

#### 7-05.1.1.1 Wet Season

The S-357 pump station will turn on when the stilling well water level reaches elevation 5.2 feet. The pump will turn off when the stilling well water level is lower than elevation 4.9 feet. The pump station will pump as required to maintain this upstream canal stage and prevent surface water discharge from the STA. The pumping discharge rate will be reduced or shutdown completely to prevent an overflow event during Phase 1 operations.

#### 7-05.1.1.2 Dry Season

The S-357 pump station will turn on when the stilling well water level reaches elevation 5.7 feet. The pump will turn off when the stilling well water level is lower than elevation 5.4 feet. The pump station will pump as required to maintain this upstream canal stage and prevent surface water discharge from the STA. The pumping discharge rate will be reduced or shutdown completely to prevent an overflow event during Phase 1 operations. Once an elevation of 10.0 feet in the STA is reached, pumping of S-357 will be constrained to 125 cfs.

### 7-05.1.2 S-331

The S-331 Pump station has three diesel driven pumps capable of pumping a total of 1160 cfs (387 cfs each). S-331 has three general operational rules:

#### 7-05.1.2.1 8.5 SMA Seepage Canal Criteria (replaces Angels Well)

The stage measured at Angel's well, located west of the 8.5 SMA protection levee, will no longer be used to determine the appropriate operating criteria for S-331.

Discharges through S-331 can be made if the S-331 Tailwater (TW) stage is below elevation 6.0 feet and the S-176 Headwater (HW) stage is below 5.5 feet, NGVD. If either of these water levels, downstream of S-331, is exceeded, discharges at S-331 will be terminated until the S-176 HW stage recedes to elevation 5.0 feet and the S-331 TW is at or below elevation 6.0 feet. If heavy rainfall is forecasted S-331 discharges will be terminated when the S-176 HW stage is between elevations 5.0 feet and 5.5 feet. The following text describes the operations of S-331 as defined by the stilling well located in the 8.5 SMA Seepage Canal (same well used for S-357 operations):

(a) If the stage at the 8.5 SMA Seepage Canal well is less than elevation 5.5 feet there will be complete flexibility in operating the L-31N Borrow Canal system within the design limits specified by the Corps. Operations include the ability to convey water from S-334 (excess water from WCA-3A or WCA-3B), S-335 with S-337 closed (excess water from the L-30 Canal), excess water from the L-31N between S-335 and G-211 (S-336 closed or discharging east), or a combination of these sources for low pumping rate (125 cfs or less per pump stations) operations of S-332B, S-332C, and S-332D. Low pumping rate operations can be initiated below the flood control operation levels.

(b) If the stage at the 8.5 SMA Seepage Canal well is between elevations 5.5 and 6.0 feet the average daily water level upstream of S-331 will be maintained between elevations 4.5 feet and 5.0 feet if permitted by downstream conditions.

(c) If the stage at the 8.5 SMA Seepage Canal well is above elevation 6.0 feet the average daily water level upstream of S-331 will be maintained between elevations 4.0 feet and 4.5 feet until the water level at the 8.5 SMA Seepage Canal well recedes below 5.7 feet if permitted by downstream conditions.

**7-05.1.2.2 Flood Control**

When the headwater stage at S-331 is higher than elevation 5.3 feet, use one pump (387 cfs) or S-173 with or without siphons to maintain stage. Once stage

recedes below elevation 5.1 feet, cease discharges. Increase pumping to two pumps when headwater is greater than elevation 6.0 feet. Once stage recedes below elevation 5.5 feet, turn off second pump. Increase pumping to three pumps when headwater is greater than elevation 6.5 feet. Once stage recedes below 6.0 feet, turn off third pump.

#### 7-05.1.2.3 Water Supply

Water supply operations are unchanged from IOP. Releases may be made when: the headwater of S-176 is lower than elevation 4.0 feet, the headwater of S-177 is lower than elevation 3.0 feet or the headwater of S-18C is lower than elevation 2.0 feet.

### 7-05.1.3 Flow to NESRS (G-3273 and L-29 Constraint)

With the completion of the 8.5 SMA flood mitigation features, the trigger well (G-3273) for the operations of flows into NESRS will no longer be used. Instead the L-29 Borrow Canal as measured at the S-355B TW will be used as the controlling criteria for discharging flows into NESRS; this location was chosen to prevent localized fluctuations due to discharges at the S-333 and S-356 from controlling. In the absence of a timely signal from S-335B TW then either the S-333 TW or S-334 HW may be used. Based on concerns from the Florida Department of Transportation (FDOT) for the integrity of Tamiami Trail between S-333 and S-334, the stage constraint of 9.0 feet from IOP will be lowered to elevation 8.0 feet. Coordination with the FDOT will occur before the transition of the canal stages above elevation 7.5 feet. At a minimum, concurrence with the stage increase above elevation 7.5 feet will be sought from the FDOT each time the canal level is planned to exceed this level due to operations of the system, including an agreement of the time duration that stages will be allowed to stay above elevation 7.5 feet. The FDOT considers that the current Design High Water for Tamiami Trail between S-333 and S-334 to be elevation 7.5 feet. Review of historical data does indicate, however, that stages above elevation 7.5 feet occasionally occurred due to direct rainfall and seepage from the area to the north (WCA-3B), independent of current operational schedules. If the L-29 Canal stage is too high then flow reductions will occur by first reducing or eliminating S-333 discharges, second

reducing or eliminating the S-355A and S-355B discharges, and finally, by reducing or eliminating S-356 discharges.

### 7-05.1.4 S-356

S-356 will be operated as defined in the IOP operating tables. When conditions permit (i.e., G-3273 and L-29 constraints), discharges from S-356 will go into L-29 Canal. Pumping will be limited to the amount of seepage into L-31N in the reach between S-335 and G-211 and the volume released from S-335 minus the portion of the S-335 release (if any) which is discharged through S-338, S-336, and G-211. A technical team will evaluate pumping limits and operations. The pumps will be operated accordingly. Stages in the L-31N Canal above 5.8 feet will trigger S-356 pumping if the L-29 Canal stage is below the mandatory off level.

### *7-05.3.* Phase *2 S-357 Operational Plan*

This plan follows the same criteria as Phase I except that with the completion of the C-111 NDA, overflow events will be allowed from the STA into the C-111 Project.

## 7-06. Flood Control Criteria

There are no provisions for pre-storm operations contained in the planning documents for the 8.5 SMA Seepage Canal.

## 7-07. Water Supply Criteria

There are no water supply requirements documented in the GRR/SEIS. Should supplemental water be required for the stormwater treatment area to maintain plant communities, coordination will be performed with the necessary federal, state, and local agencies.

## 7-08. References

USACE, Final Environmental Assessment for the Design Modification for the Canal 111 (C-111) Project Miami-Dade County, Florida and Engineering Documentation Report, June 2007

USACE, Final Environmental Impact Statement Interim Structural and Operational Plan (IOP) for Protection of the Cape Sable Seaside Sparrow, Everglades National Park, Miami-Dade County Florida, December 2006 http://planning.saj.usace.army.mil/envdocs_M_P/Miami-Dade/CapeSableSeasideSparrow/index.html

USACE, Final Revised General Reevaluation Report/Second Supplemental Environmental Impact Statement (RGRR/SEIS) for the Tamiami Trail Modifications on the Modified Water Deliveries to Everglades National Park Project, dated August 2005

USACE, General Reevaluation Report (GRR) and Final Supplement to the 1992 Final Environmental Impact Statement on the Modified Water Deliveries (MWD) to Everglades National Park (ENP) Project for the 8.5 Square Mile Area (SMA), dated July 2000.
http://www.saj.usace.army.mil/dp/8-5sma/final8-5.htm

USACE, Final Integrated General Reevaluation Report and Environmental Impact Statement, Canal 111 (C-111) South Dade County, Florida, dated May 1994

USACE, Part I, Supplement 55, Feature Design Memorandum No. 1, Modified Water Deliveries (MWD) to Everglades National Park (ENP), Florida, September 1993

USACE, Part I, Supplement 54, General Design Memorandum and Environmental Impact Statement, Modified Water Deliveries (MWD) to Everglades National Park (ENP), Florida, June 1992

Table 1 Operational Revisions to IOP Table

| | | *** Denotes Gage in Seepage Canal** |
|---|---|---|
| **S-357** | | |
| Wet Season | 5.2 feet***** (On) | 4.9 feet* (Off) |
| | | |
| Dry Season | 5.7 feet***** (On) | 5.4 feet* (Off) |
| General Rules: | | |
| 1) The electric pump can be substituted for any of the diesel driven pumps. | | |
| 2) Pump as required to maintain optimum canal level without overflow of STA weirs. | | |
| . | | |
| | | |
| **S-331** | | |
| | 5.5 feet***** | Maintain L-31N between 4.5 feet and 5.0 feet |
| | 6.0 feet***** | Maintain L-31N between 4.0 feet and 4.5 feet |
| | | Downstream Constraint, S-176 has to be less than 5.5 feet. |
| **Flood Control** (From CSOP Table) | ON (S-331 HW) | OFF (S-331 HW) |
| Pump or use up to two siphon based on downstream constraints. | 5.3 feet (1st Pump) | 5.1 feet (1st Pump) |
| | 6.0 feet (2nd Pump) | 5.5 feet (2nd Pump) |
| | 6.5 feet (3rd Pump) | 6.0 feet (3rd Pump) |
| **Water Supply** (From CSOP Table) | | |
| | L-31N/S-176 HW < 4.0 feet | |
| | C-111/S-177 HW < 3.0 feet | |
| | S-18C < 2.0 feet | |
| | | |
| **Closure Criteria** (S-331) | | |
| | S-176 HW >5.5 feet | |
| | S-331 TW< 6.0 feet | Allows for half foot slope on canal |
| **Gravity discharges thru S-173 and S-331 as TW allows** | Operated in Conjunction with S-331<br>Intention is to maximize use of S-173 with S-357 before the first pump at S-331 is turned on. | |
| Flood Control | 5.1 feet (open) S-173 HW | 4.9 feet (closed) S-173 HW |
| Water Supply | Same as S-331 | |
| | Closed when S-331 is pumping. | |

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